

IV.2 Persperase of MIAKE, Danean 5P 203 Outle ARR, 5racoe mon support. As

discussed in the text, the support structure is a component of the full international project

Outline

√QGP

- what we learned at RHIC and homework for LHC
- √ Jet quench
 - Jets/hard EM
 - property of QGP
- ✓ DiJet Calorimeter
 - design, rates, schedule
 - Japan-French collaboration
- ✓Analysis Mechanism

√Summary

New proposal in FJPPL2010

in this talk, focus on Jet Quench





Yasuo MIAKE, June 15, 2010, LAPP, France



What we learned at RHIC

$$\epsilon_{\rm QGP} \sim 2 \ [{\rm GeV/fm}^3]$$

$$< n_{q,\bar{q}} > \sim \frac{\epsilon_{\rm QGP}}{< m_T >} \sim \frac{2{\rm GeV}}{0.4{\rm GeV}} \sim 5$$

$$\lambda_q = \frac{1}{n\sigma_{qq}}$$

$$\sim \frac{1}{5 \times 0.4} = 0.5 \ [{\rm fm}]$$

$$\lambda_q \ll R_{\rm system}$$



- Strongly interacting QGP
- Statistical nature & space/time evolution of collisions well established
 - Hadro-chemical equilibrium (T, μ)
 - Hinematical equilibrium (T, β)
 - Universal pt&azimuthal distributions of quarks (Quark coalescence model)







CAMBRIDGE

Catalogue

Home > Catalogue > Quark-Gluon Plasma



Quark-Gluon Plasma

Series: Cambridge Monographs on Particle Physics, Nucle

Kohsuke Yagi Urawa University, Japan

Tetsuo Hatsuda University of Tokyo

Yasuo Miake University of Tsukuba, Japan

Hardback (ISBN-10: 0521561086 | ISBN-13: 9780521561(For price and ordering options, inspection copy requests, and rea UK, Europe, Middle East and Africa | Americas | Australia and Ne





				10°	uncased in the EeX, the Support Structure is a comparison of the initial material in a score Five PHOS models are shown although only three flows continuous with proposed DCal, as installedin ALICEBIT the modern and cosisdered put of DCa
					(h ⁺ +h)/2, s ^{1/2} = 5500 GeV
				2	p ⁰ , s ^{1/2} = 5500 G₩
			_	10 ²	(h [*] +h)/2, s ^{1/2} = 200 GeV
					p ⁰ , s ^{1/2} = 200 GeV
	RHIC		_	4 -4	(h [*] +h)/2, s ^{t/2} = 17 GeV
			~	10	p ⁰ , s ^{1/2} = 17 GeV
√ s _{NN} (GeV)	200	5500	Ğ		LO pQCD by I. Vitev.
			ę	106	hep-ph/0212109
			느	10	
	1.9	3.0-4.2	_d		
			yd	10^{8}	
			p/s	10	$< k_{r} > = 1.8 \text{ GeV}$
ε (GeV/fm ³)	5	15-60	ð		RHIC $Q^2 = p_r^2$
				10^{10}	
	2-4	>10			
	2-4	210		12	SPS
			_ ,	10'2	
					0 50 100 150
					p _⊤ [GeV]

Ο

 \checkmark Home work to the LHC, physics of jet quench

LHC has superior advantage in hard probes

Yasuo MIAKE, June 15, 2010, LAPP, France







"Jet quenching" in nucleusnucleus collision.

- ✓ Two quarks suffer a hard scattering in AA collision
 - One goes out to vacuum creating jet,
 - but the other goes through the QGP suffering energy loss due to gluon

\checkmark Manifestation:

- attenuation/ disappearance of jet
- suppression of high pt hadrons
- modification of jet frag. 7













Characteristic Energy Loss in dense matter the property of the matter



\checkmark Measurements of dE/dx gives prop. of matter

Energy loss in QED plasma gives T & mp info.





IV.2 Perspective view of the DCal and PHOS integrated on a common support. As discussed in the text, the support structure is a component of the full international proje scope. Five PHOS modules are shown although only three, those contiguous with the provide the provided of the pro



✓Many theories on

- Collisional loss
- Radiative loss
 - ➡Bethe-Heitler regime
 - ⇒LPM regime

Yasuo MIAKE, June 15, 2010, LAPP, France

"dead-cone" effect



$\Delta E \propto \alpha_S C_{\rm R} \langle \hat{q} \rangle L^2$

(Executive) Summary

Radiative loss is dominant

Effects are;

- suppression of high pt hadron
- unbalanced back-to back
- modification of jet fragmentation softer, larger multiplicity, angular broadening

 $\Delta E_{\rm gluon} > \Delta E_{\rm quark} > \Delta E_{\rm charm} > \Delta E_{\rm bottom}$



DCal as an extension of EM-Cal



DiJet Calorimeter

✓ For better performance of back-to back capability

- ➡Define back-to back jets
- Trigger back-to back jets
- ✓Progress
 - Proposed in Feb.,09
 - Discussed w. IN2P3 in May, 09
 - Discussed in March,09
 - Proposal in May, 09
 - Partial approval in July, 09
 - Full approval by ALICE in Oct. 09
- Construction started !



Beam View

5 contiguous modules possible, while exact backto-back is 3





<u> γ -Jet</u>





✓ Quark Jet
 ✓ Small Xsection
 ✓ Experimentally challenging

 Mostly Gluon Jet
 Larger Xsection
 Interpretation is complicated ✓ Clean π⁰ trig
 ✓ Large Xsection
 ✓ Important for
 DCal

0

 π^{0} -Jet

Systematic meas. of these processes for model comparison provides at high precision level.

Yasuo MIAKE, June 15, 2010, LAPP, France



For 10⁴ events/year in Pb+Pb@5.5TeV,
Inclusive jet up to 200 GeV
Di-Jet to 100 GeV

Yasuo MIAKE, June 15, 2010, LAPP, France





scope. Five PHOS modules are shown although only three, those contiguous with t proposed DCal, are installed in ALICE at the moment and considered part of DCal.

France-Japan collaboration for ALICE-DCal

Institute & People

LPSC Grenoble

- Christophe Furget
- Jean-François Muraz

Subatech Nantes

Manoel Dialinas

IPHC Strasbourg

Christelle Roy

Contributions to DCal

LPCS Grenoble: -DCal module straps -DCal supper module (SM) cables

-DCal platform, shipping boxes -DCal SM assembly

Subatech Nantes:

DCal SM installation tool, support structure, integrationDCal strip module production, DCal strong back



DCal SM platform (LPSC)



DCal support structure (Subatech)



DCal SM shipping crate (LPSC)



DCal straps (LPSC)



DCal installation tool (Subatech)



DCal weight cal. (Subatech)



Assembly, cabling, calibration, storage and shipping of all DCal SModules.









Responsibilities



Group	Group Leader	Proposed Responsibilities
USA	T.J. Symons, LBNL	3 super modules
		Detector design
		Overall project management
		Project technical coordination
		DCal LED system
Japan	Y. Miake, Tsukuba	1.5 super module
France	C. Roy, IPHC Strasbourg	0.5 super modules
		Support structure design, fabrication
		Oversight and payment of up to 2/3 the
		cost
		Installation tooling design
		Installation oversight
		Jet trigger Design, hardware and integration
		SM integration and cosmic calibration
China	D. Zhou	1 super module
Italy	N. Bianchi	Module assembly
		Fiber production facilities

Japanese Analysis Facility discussed with French experts within Asian communities at Hiroshima in Jan. 2010

ALICE Analysis Workshop for Asian Communities

January 21-23, 2010, Graduate School of Science, Hiroshima University, Higashi-Hiroshima, Japan



ALICE Analysis Workshop for Asian Communities

ALICE Analysis Workshop for Asian Communities will be held from January 21 to 23 at

Graduate School of Science, Hiroshima University, Higashi-Hiroshima, Japan.

The aim of our workshop is to share information on the current status of ALICE physics analyses for Asian communities and to work out our strategy in the near Remarks from the workshop;

- Active discussion started.
- FJPPL project members involved.
- Successful PROOF demo. carried out.
- Asian communities quite interested in.
- ◆ Task-force group formed.
- ◆ All activities are in scope of this project.

Program Participants Location Lodging Photos

In particular, the workshop will focus on the following tor

- ALICE Analysis Framework and Practices
- ALICE Computing Strategy and Status

Produced by Experimental Quark Physics Laboratory, Graduate School of Science, Hirosh

• ALICE Analysis Facilities for Asian Communities

Organizing Committee

Sugitate, Toru	Hiroshima University	(Chair)		
Shigaki, Kenta	Hiroshima University			
Miyoshi, Takahiro	Hiroshima University			
Nakamiya, Yoshihide	Hiroshima University			
Ouchida, Misaki	Hiroshima University			
Takahashi, Emi	(Secretary)			

Takahashi, Emi

Sponsorship

1SPS

future.

FJPPL project members in color **CN CN** CN

ALICE Tier-2 at Hiroshima

- •The ALICE WLCG site "JP-HIROSHIMA-WLCG" with EGEE/gLite3.2 on SLC5;
- •A full WLCG service up and running; VOBOX , LCG-CE, CREAM-CE, BDII, WMS/LB, XROOTD-SE, APEL, UI, etc..
- •CPU and storage resources;

752 Xeon-cores and 276 TB disk servers

Currently ~2/3 of resources in local use

- Network B/W: MPLS 1Gbps to KEK on SINET3
- •ALICE associated Tier-1 in CCIN2P3/ Lyon

37/50Mbps to CCIN2P3/Subatech

•Responsible by Prof. T. Sugitate/Deputy Leader

 Some more resources at Tsukuba and Tokyo.



Summary of Japanese Analysis Facility

- •Infrastructure (CPU, storage, network) exists in Asian institutes, e.g., at Hiroshima and KISTI
- Software framework exists or under development in French institutes
- Closer collaboration between France/Japan turns out to
 - challenge fast data analyses and strengthen Asian communities
 - establish and spread new technologies, e.g., PROOF on GRID

innovate a global computing model at large distances

•Primary people involved and request

- France: YS/SUBATECH, RV/CCIN2P3, ??
- ◆ Japan: TS/Hiroshima, HH/Tokyo, ??/Tsukuba

Our requirements



1										
EXPLOITATION OF HARD EM PROBES AND JETS TO STUDY THE QGP WITH LHC-ALICE			Description							
French Group Japanese Group		oup	Visit to Japan	€/unit	Nb of units	Total (€)	Requested to: 1			
Name	Title	Affiliation	Name	Title	Affiliation	Travels	150/day	20 days	3000	IN2P3
Leader:	DR1	SUBATECH	Leader:				1000	4 travels	4000	IN2P3
Yves Schutz			Yasuo Miake	Prof.	Univ. of		1000		1000	
D . 1 1	CDI	IDUG		D.C.	I sukuba					
Chistelle Roy	CRI	IPHC	Shinichi Esumi	Prof.	Univ. of Tsukuba	Total			7000	
Christophe Furget	Pr	LPSC	Tatsuya Chujo	Dr.	Univ. of	Funding from Japan				
					Tsukuba	Description	k¥/Unit	Nb of units	Total (k¥)	Requested to
Renaud Vernet	Dr	CCIN2P3	Takuma Horaguchi	Dr.	Univ. of	Description				
					Tsukuba	Travel	150	10	1500	KEK
Manoel Dialinas	IR1	SUBATECH	Deputy leader: Toru Sugitate	Prof.	Hiroshima University	Visit to France	20/day	150	3000	KEK
Magali Estienne	CR1	SUBATECH	Kenta Shigaki	Prof.	Hiroshima	Travel + per diem	300	10	3000	KEK
					University					
Gustavo Conesa	Dr	LPSC	Hisayuki Torii	Dr.	Hiroshima					
					University				7500	
Rachid Guernane	CR1	LPSC	Hideki Hamagaki	Prof.	Univ. of Tokyo	Total				
Julien Faivre	MC	LPSC	Takuma Gunji	Dr.	Univ. of Tokyo	L	<u> </u>	v	,	
Marco Bregant	Dr	SUBATECH								

✓ French ; 10 people asking 7000€ for travel
 ✓ Japanese; 9 people asking 7500k¥ for support





$\checkmark \text{New application to FJPPL}$

- Asking support for DCal/EMCal projects,
 - which has emerge as rapid growing prjects at ALICE
 - Tighten <u>Japan-France</u>-USA-Italy-China collaboration
 - Closer collaboration between Japan-France
 - Two students/PD will stay Nates, Grenoble,,,
 - Data Analysis mechanism;
 - ➡to combine Asian efforts